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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/656,280	09/08/2003	Tatsuya Niimi	242548US2	7137

22850 7590 11/08/2007
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EXAMINER	
DOTE, JANIS L	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
11/08/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/656,280	NIIMI ET AL.	
	Examiner	Art Unit	
	Janis L. Dote	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicants' submission filed on Sep. 6, 2007, has been entered.

2. The examiner acknowledges the amendments to claims 1, 5, and 13-15 and the cancellation of claims 16-20 filed on Aug. 6, 2007, which was entered upon the filing of the RCE. Claims 1-15 are pending.

3. Applicants' election without traverse of the invention of Group I, claims 1-15, in the reply filed on Nov. 14, 2005, is acknowledged.

4. The rejection of claim 15 under 35 U.S.C. 112, second paragraph, set forth in the office action mailed on May 15, 2007, paragraph 10, has been withdrawn in response to the amendment to claim 15 filed on Aug. 6, 2007, which was entered upon the filing of the RCE.

The objection to claim 13 set forth in the office action mailed on May 15, 2007, paragraph 11, has been withdrawn in response to the amendment to claim 13 filed on Aug. 6, 2007, which was entered upon the filing of the RCE.

The rejections of claims 17 and 18 under 35 U.S.C. 103(a) over the cited prior art, set forth in the office action mailed on May 15, 2007, paragraphs 13 and 14, have been mooted by the cancellation of those claims filed on Aug. 6, 2007, which was entered upon the filing of the RCE.

5. The examiner notes that the instant specification at page 20, lines 13-18, defines the term "proximal charging system charging member" recited in instant claim 12 as "a charging member which is not brought into contact with but proximal to the surface of the photoconductor so as to have a gap of 200 μm or less between the surface of a photoconductor and the surface of the charging member."

6. Claim 14 is objected to because of the following informalities:

In claim 14, the phrase "is configured to be applied a superimposed alternating voltage' is not idiomatic English.

Appropriate correction is required.

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 1, 2, 5, 7, 8, 10, 11, 13, and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by, or in the alternative, under 35 U.S.C. 103(a) as obvious over US 6,853,823 (Sugino), as evidenced by applicants' admissions at page 3, line 10, to page 4, line 10, and page 10, lines 12—13 (applicants' admission 1).

Sugino discloses an image forming apparatus and a process cartridge that meet the apparatus and the process cartridge limitations recited in the instant claims. The image forming apparatus comprises a photoreceptor **1**, a charger **3**, a light irradiator **5**, an image developer **6**, and a transfer device **10, 11**. Fig. 3, and col. 10, line 53, to col. 11, line 15. Sugino further teaches an image forming apparatus comprising a plurality of image forming units, each comprising a photoreceptor **101**, a charger, a light irradiator, an image developer, a cleaner, and a transfer device **102**. Fig. 5 and col. 12, lines 34-43. Sugino also teaches a process cartridge that comprises a photoreceptor with a charger, an image irradiator, or an image developer. See reference claim 9. Sugino teaches that the charger can be a charging roller, which

meets the charger limitation recited in instant claims 11 and 13. Col. 10, lines 60-61. Sugino teaches that the light irradiator can emit a write light having a resolution of 600 dpi, 1,200 dpi, or 2,400 dpi. Col. 17, lines 25-27; and col. 19, lines 24-26. The photoreceptor comprises a conductive support, a charge generation layer, a charge transport layer disposed on the charge generation layer, and a protective layer. Example 1 at cols. 16-17. The charge transport layer is formed using tetrahydrofuran, a non-halogen solvent, which meets the solvent limitations recited in instant claims 7 and 8. The protective layer comprises alumina fine particles, which meet the protective layer limitations recited in instant claim 5. The charge generation layer comprises titanyl phthalocyanine crystals that exhibit an X-ray diffraction pattern having a maximum peak at a Bragg angle of 27.2°, a lowest peak at 7.3°, peaks at 9.4°, 9.6°, and 24°, no peaks between 7.4° and 9.3°, and no peak at 26.3°. Fig. 7; and example 1. The location of the peaks at angles 7.3°, 9.4°, 9.6°, 24°, and 27.2° were determined by measuring the positions of the peaks with a ruler and interpolating the positions on the x-axis scale in Fig. 7. The X-ray diffraction pattern meets the peak location limitations recited in instant claims 1 and 2.

Sugino does not disclose that the X-ray diffraction was

obtained with the Cu-Kα wavelength of 1.542 Å. However, as discussed above, the Sugino X-ray diffraction pattern meets the peak location limitations recited in instant claims 1 and 2. Accordingly, it is reasonable to presume that the X-ray diffraction pattern disclosed in Sugino was determined with Cu-Kα X-ray radiation having the Cu-Kα wavelength of 1.542 Å as recited in the instant claims. The burden is on applicants to prove otherwise. In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

Sugino does not expressly describe that its image developer **6** develops a latent electrostatic image formed on the photoreceptor within 200 msec after the surface of the photoreceptor is exposed by its light irradiator **5** as recited in instant claim 1. Nor does Sugino expressly describe that its light irradiator **5** irradiates a write light to the surface of the photoreceptor with an exposure energy of 5 erg/cm^2 or less as recited in instant claim 1.

However, for the reasons discussed supra, the apparatus and the process cartridge disclosed by Sugino meet all of the structural limitations and compositional limitations recited in the instant claims. The recitations of how much energy is provided by the light irradiator and of how fast the apparatus develops a latent electrostatic image after light exposure do not distinguish the structural elements in the instantly claimed

apparatus and process cartridge from those in the apparatus and process cartridge disclosed by the cited prior art. "Claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function." MPEP 2114 and cases cited therein. "A claim containing a 'recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus' if the prior art apparatus teaches all the structural limitations of the claim." MPEP 2114, citing Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Furthermore, according to Sugino, its image forming apparatus and tandem full color image forming apparatus are "high-speed printing" apparatuses that provide simultaneously "high-quality image production and high durability." Col. 2, lines 63-67, and col. 3, lines 58-63. According to the instant specification, the characteristic time in speedup monochrome electrophotographic apparatuses from a "writing portion," i.e., exposure from the light irradiator in the apparatus, to a "development portion," i.e., development of the latent image with a toner, is "about 200 msec at the longest." See the instant specification, the paragraph bridging pages 3 and 4. Thus, the time between light writing and development of "within 200 msec" recited in instant claim 1 appears to be

characteristic of the state of art as of the filing date of the instant application. The instant specification further discloses that in tandem full-color electrophotographic apparatus, where the photoconductors have a diameter of 30 μm and the copying speed reaches 30 sheets/min or greater, "the time between exposure and development can be set only equal to or less than that of the monochrome electrophotographic apparatus." Page 4, lines 2-10. Thus, a person having ordinary skill in the art would have reasonably expected that the time from exposure to development in "speedup" image forming apparatuses based on the state of the art, such as those taught by Sugino, is at most 200 msec.

Moreover, according to the instant specification at page 10, lines 12-13, its image forming apparatus provides "stable images free of line thickening even after repeated use at high speed." As discussed above, the Sugino image forming apparatuses meet all the structural and compositional limitations recited in the instant claims. Sugino teaches that its image forming apparatuses are "high-speed printing" apparatuses that provide "high-quality image production." According to Sugino, when an image forming apparatus comprises its photoreceptor in example 1 and images are formed with a writing light of 600 dpi resolution, that apparatus provides

500,000 "good" images. See example 1 and Table 1, example 1. Thus, because the Sugino image forming apparatus meets all the recited structural and compositional limitations of the instant claims and provides 500,000 "good" images of 600 dpi, i.e., stable images after repeated use, it is reasonable to presume that the light irradiator also provides an exposure energy as recited in instant claim 1. The burden is on applicants to show otherwise.

9. US 2003/0104295 (Niimi'295) has a filing date of Mar. 22, 2002, and was published on Jun. 5, 2003, which are both prior to the filing date of the instant application. Thus, Niimi'295 qualifies as art under 35 U.S.C. 102(a), as well as under 35 U.S.C. 102(e). Accordingly, Niimi'295 also qualifies as prior art under 35 U.S.C. 103(c).

10. Claims 1, 2, and 4-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niimi'295, as evidenced by applicants' admissions at page 3, line 10, to page 4, line 10 (applicants' admission 2), Japanese Patent 2000-319538 (JP'538), as evidenced by Ladd et al., Structure Determination by X-ray Diffraction, p. 426 (Ladd), combined with US 2001/0022343

(Sakai). See the USPTO English-language translation of JP'538 for cites.

Niimi'295 discloses an image forming apparatus and a process cartridge. The image forming apparatus comprises a photoreceptor **6**, a charger **8**, a light irradiator **10**, an image developer **11**, and a transfer device **15**. Fig. 5 and paragraphs 0115, 0116, and 0122. Niimi'295 further teaches an image forming apparatus comprising a plurality of image forming units, each comprising a photoreceptor, a charger, a light irradiator, an image developer, and a transfer device. Fig. 10 and paragraphs 0127-0128. Niimi'295 also teaches a process cartridge that comprises a photoreceptor with a charger, an image irradiator, an image developer, and a cleaner. Fig. 7 and paragraph 0126. Niimi'295 teaches that the charger can be a contact charging system, such as a contact charging roller, as recited in instant claim 11, or a non-contact proximal charging system as recited in instant claims 12 and 13. Paragraphs 0117-0118. Niimi'295 also teaches that an alternating superimposed voltage can be applied to the charger, which meets the charger limitation recited in instant claim 14. Paragraph 0119.

Niimi'295 exemplifies a photoreceptor comprising a conductive support, a charge generation layer, a charge

transport layer disposed on the charge generation layer, and three protective layers. See example 14 at pages 24-26. All three protective layers comprise α-alumina fine particles having a resistivity of 2.5×10^{12} Ω·cm, which meets the protective layer limitations recited in instant claims 5 and 6. Niimi'295 further discloses that the three protective layers can comprise a charge transferring polycarbonate having a side-chain comprising a triarylamine structure; and that they are formed using non-halogen solvents such as tetrahydrofuran and cyclohexanone. See example 7 at pages 21-22, and example 14. Because the first and second protective layers comprise the charge transferring polycarbonate, the layers are characterizable as charge transport layers and therefore meet the charge transport layer limitations recited in instant claims 4, 7, and 8. Niim'295 also teaches that the conductive support can be an anodized surface as recited in instant claim 9. Paragraphs 0047-0048. The charge generation layer comprises titanyl phthalocyanine crystals dispersed in a binder resin. The titanyl phthalocyanine crystals exhibit an X-ray diffraction pattern having a maximum peak at a Bragg angle of 27.2°, a lowest peak at 7.3°, peaks at 9.4°, 9.6°, and 24°, no peaks between 7.4° and 9.3°, and no peak at 26.3°. See Fig. 8. The location of the peaks at angles 7.3°, 9.4°, 9.6°, 24°,

and 27.2° were determined by measuring the positions of the peaks with a ruler and interpolating the positions on the x-axis scale in Fig. 8. The X-ray diffraction pattern meets the peak location limitations recited in instant claims 1 and 2.

Niimi'295 does not disclose that the X-ray diffraction was obtained with the Cu-Kα wavelength of 1.542 Å. However, as discussed above, the Niimi'295 X-ray diffraction pattern meets the peak location limitations recited in instant claims 1, 2, and 17. Accordingly, it is reasonable to presume that the X-ray diffraction pattern disclosed in Niimi'295 was determined with Cu-Kα X-ray radiation having a wavelength of 1.542 Å as recited in the instant claims. The burden is on applicants to prove otherwise. Fitzgerald, supra.

Niimi'295 does not disclose that its light irradiator provides a write light having a resolution of 600 dpi or greater as recited in the instant claims.

Sakai discloses a multi-beam scanning device to imagewise irradiate the charged photoconductor to form a latent electrostatic latent image. The multi-beam scanning device comprises a semiconductor laser (i.e., a laser diode) array **112** and a rotary polygonal mirror **152**. Fig. 6, paragraph 0131. The writing density of the multi-beam scanning device is 1200 dpi and the laser beam has a beam spot diameter of 30 μm.

Paragraph 0137. The writing density of 1200 dpi meets the resolution limitations recited in instant claim 1. According to Sakai, the multi-beam scanning device "effectively reduces the variations of the beam spots on the scanned surface to a smallest possible level so that the multi-beam scanning is carried out with accurate beam spot diameter so as to create good quality reproduced image." Sakai discloses that in conventional multi-beam scanning devices, the divergence angle of the laser beams emitted by the semiconductor laser array is liable to variations that cause the degradation of the quality of a reproduced image. Paragraph 0009.

It would have been obvious for a person having ordinary skill in the art to use the Sakai multi-beam scanning device as the light irradiator in the apparatus or the process cartridge disclosed by Niimi'295. That person would have had a reasonable expectation of successfully obtaining an image forming apparatus and a process cartridge that provide good quality reproduced images having a resolution of 1200 dpi.

The cited prior art does not expressly describe an image developer that develops a latent electrostatic image formed on the surface of the photoreceptor within 200 msec after the surface of the photoreceptor is exposed by the light irradiator as recited in instant claim 1. Nor does cited prior art

expressly describe a light irradiator that irradiates a write light on the surface of the photoreceptor with an exposure energy of 5 erg/cm^2 or less as recited in instant claim 1.

However, said recitations are merely functional language describing how the apparatus functions. For the reasons discussed supra, the apparatuses and process cartridge rendered obvious over the combined teachings of the prior art meet all of the structural and compositional limitations recited in the instant claims. The functional recitations do not distinguish the structural elements in the instantly claimed apparatus and process cartridge from those in the apparatuses and process cartridge rendered obvious over the cited prior art.

Furthermore, according to Niimi'295, by using its image forming apparatuses and process cartridge, "high speed printing is possible . . . high qualities images can be formed steadily even after repeated use." Paragraph 0023. According to the instant specification, the characteristic time in speedup monochrome electrophotographic apparatuses from a "writing portion," i.e., exposure from the light irradiator in the apparatus, to a "development portion," i.e., development of the latent image with a toner, is "about 200 msec at the longest." See the instant specification, the paragraph bridging pages 3 and 4. Thus, the time between exposure and development of

"within 200 msec" recited in instant claim 1 appears to be characteristic of the state of the art as of the filing date of the instant application. The instant specification further discloses that in tandem full-color electrophotographic apparatus, where the photoconductors have a diameter of 30 μm and the copying speed reaches 30 sheets/min or greater, "the time between exposure and development can be set only equal to or less than that of the monochrome electrophotographic apparatus." Page 4, lines 2-10. Thus, a person having ordinary skill in the art would have reasonably expected that the time from exposure to development in speedup image forming apparatuses based on the state of the art, such as those taught by Niimi'295, is at most 200 msec.

Moreover, as discussed above, the Niimi'295 teaches a photoreceptor that meets all the structural and compositional limitations recited in the instant claims. In addition, in example 14 of Niimi'295, a semiconductor laser of 780 nm is used as the light source for image exposure. JP'538 exemplifies a photoreceptor comprising a charge generation layer comprising titanyl phthalocyanine crystals that exhibit an X-ray diffraction pattern that is similar to that of the Niimi'295 titanyl phthalocyanine crystals and that meets the peak locations recited in instant claims 1 and 2. The JP'538 X-ray

diffraction pattern has a maximum peak at a Bragg angle of 27.2° ± 0.2° and a lowest peak at an angle of 7.3°, when a specific X-ray of Cu-Kα having a wavelength of 1.514 Å irradiates the titanyl phthalocyanine pigment. Translation, paragraph 0012, and example 1 in paragraphs 0047-0052 and in Table 1, and Fig. 5. JP'538 teaches that there are no peaks between Bragg angles 7.4° and 9.4°. Translation, paragraph 0012. The interval between the peaks meets the limitation of "not having a peak within the range of from 7.4 to 9.3°" recited in instant claim 1. The diffraction spectrum further has a peak at 9.5°, a peak at 9.7°, a peak at 24°, and no peak at 26.3°. See Fig. 5. The peaks at 27.2°, 7.3°, 9.5°, 9.7°, and 24°, and no peak at 26.3° meet the limitations in the "X-ray diffraction spectrum" recited in instant claims 1 and 2. The locations of the peaks at angles 9.5°, 9.7°, and 24° were determined by measuring the positions of the peaks with a ruler and correlating the positions with the x-axis in Fig. 5. (The JP'538 reported wavelength of 1.514 Å appears to be a typographical error. The "Cu-Kα wavelength" of 1.514 Å does not appear to exist. It is well known that the Cu-Kα spectra line is a doublet consisting of α1 (λ = 1.5405) and α2 (λ = 1.5443). The weighted mean Kα line is 1.542 Å, which is the value normally used in Cu-Kα X-ray diffraction. See Ladd, p. 426. Accordingly, because JP'538 teaches using the

X-ray of Cu-Kα and that Cu-Kα is known in the art to have mean wavelength of 1.542 Å, it is reasonable to presume that the X-ray diffraction spectrum disclosed in JP'538 is determined with Cu-Kα having a wavelength of 1.542 Å. The burden is on applicants to prove otherwise. Fitzgerald, supra.) According to JP'538, the light exposure energy at a wavelength of 780 nm required to reduce the surface potential of the photoreceptor 15 seconds after charging is 0.20 μJ/cm^2, i.e., 2 erg/cm^2. See Table 3 at page 29 and the accompanying text. The light exposure energy of 2 erg/cm^2 is within the range of "5 erg/cm^2 or less" recited in instant claim 1. Accordingly, because Niimi'295 photoreceptor comprises titanyl phthalocyanine crystals that appear to exhibit a X-ray diffraction pattern that is similar to that of JP'538, it is reasonable to presume that the photosensitivity of the Niimi'295 photoreceptor would also be similar to that in JP'538. The burden is on applicants to prove otherwise.

Thus, it would have obvious for a person having ordinary skill in the art to minimize, through routine experimentation, the light exposure energy in the image forming apparatus rendered obvious over the combined teachings of Niimi'295 and Sakai such that the light exposure is within the range of 5 erg/cm^2 or less as recited in instant claim 1. The

"motivation" to minimize the light exposure energy is the common technological desire to maximize the efficient use of energy in processes and apparatuses.

11. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Niimi'295 combined with Sakai, as evidenced by applicants' admission 2, JP'538, and Ladd, as applied to claim 1 above, further combined with Japanese Patent 11-140337 (JP'337), as evidenced by Ladd. See the USPTO English-language translations of JP'538 and JP'337 for cites.

Niimi'295, as evidenced by applicants' admission 2, JP'538, and Ladd, combined with Sakai, renders obvious an image forming apparatus as described in paragraph 10 above, which is incorporated herein by reference.

Niimi'295 does not exemplify the use of titanyl phthalocyanine crystals having an average particle diameter as recited in the instant claim. However, as discussed in paragraph 10 above, the Niimi'295 charge generation layer comprises titanyl phthalocyanine crystals dispersed in a binder resin, where the titanyl phthalocyanine crystals exhibit an X-ray diffraction pattern having a maximum peak at a Bragg angle of 27.2°.

JP'337 teaches a dispersion comprising a titanyl

phthalocyanine crystal that exhibits an X-ray diffraction pattern having a maximum peak at a Bragg angle ($2\theta \pm 0.2^\circ$) of 27.2° and a particular polyvinyl acetyl binder resin. The diffraction pattern is obtained by irradiating the titanyl phthalocyanine with a Cu-Kα X-ray having a wavelength of "1.514 Å." Translation, paragraph 0007 and 0050-0051; and dispersion 2 in paragraph 0053 and in Table 1 at page 39. According to JP'337, when the dispersion of titanyl phthalocyanine is used to form a charge generation layer in a photoreceptor, the resulting photoreceptor has high sensitivity even after repeated use. The chargeability of the photoreceptor does not decrease and the residual potential does not increase after repeated use. Translation, paragraph 0006.

The JP'337 reported wavelength of 1.514 Å appears to be a typographical error. The Cu-Kα wavelength of 1.514 Å does not appear to exist. It is well known that the Cu-Kα spectra line is a doublet consisting of $\alpha 1$ ($\lambda = 1.5405$) and $\alpha 2$ ($\lambda = 1.5443$). The weighted mean Kα line is 1.542 Å, which is the value normally used in Cu-Kα X-ray diffraction. See Ladd, p. 426. Accordingly, because JP'337 teaches using the X-ray of Cu-Kα and because Cu-Kα is known in the art to have mean wavelength of 1.542 Å, it is reasonable to presume that the X-ray diffraction pattern disclosed in JP'337 is determined with Cu-Kα having a

wavelength of 1.542 Å, as recited in the instant claims. The burden is on applicants to prove otherwise. Fitzgerald, supra.

JP'337 does not explicitly disclose that the titanyl phthalocyanine crystal has an average particle diameter of not greater than 0.3 μm as recited in instant claim 3. However, JP'337 discloses that the titanyl phthalocyanine is milled with a particular polyvinyl acetal and a solvent. The resultant dispersion comprises particles having a mean grain diameter of 0.28 μm. See the translation, Table 1 at page 39, dispersion 2. The dispersion particle size of 0.28 μm is within the range of not greater than 0.3 μm recited in instant claim 3. Thus, it is reasonable to conclude that the titanyl phthalocyanine crystal has an average particle diameter of not greater than 0.3 μm as recited in instant claim 3. The burden is on applicants to prove otherwise. Fitzgerald, supra.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of JP'337, to form a dispersion comprising the Niimi'295 titanyl phthalocyanine crystals and the JP'337 particular polyvinyl acetal binder resin as taught by JP'337, such that the resultant dispersion has a mean grain diameter of 0.28 μm, and to use the resultant dispersion to form the charge generation layer in the photoreceptor disclosed by Niimi'295. That person would have

had a reasonable expectation of successfully obtaining an image forming apparatus that has improved photosensitivity and that has stable charging properties and residual potential properties after repeated use.

12. Claims 1, 2, 5-8, 10, 11, and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0076633 A1 (Niimi'633), as evidenced by applicants' admission 2, JP'538, and Ladd, combined with Sakai. See the USPTO translation of JP'538 for cites.

Niimi'633 discloses an image forming apparatus that comprises a photoreceptor **1**, a charger **8**, a light irradiator **10**, an image developer **11**, and a transfer device **15a, 15b**. Fig. 3 paragraphs 0061 and 0300-0305. Niimi'633 further teaches an image forming apparatus comprising a plurality of image forming units, each comprising a photoreceptor, a charger, a light irradiator, an image developer, a cleaner, and a transfer device. Fig. 7 and paragraphs 0320-0324. Niimi'633 teaches that the charger can be a contact charging system, such as a contact charging roller, as recited in instant claim 11. Paragraph 0302 and Fig. 3, reference label **8**. Because the contact charging roller is in contact with the photoconductor, it meets the charger limitation recited in instant claim 13 that

the gap between the charging member and the photoconductor is "200 μm or less." Niimi'633 also teaches that an alternating superimposed voltage can be applied to the charger, which meets the charger limitation recited in instant claim 14. Paragraph 0302.

Niimi'633 exemplifies a photoreceptor comprising an aluminum conductive drum, a charge generation layer, a charge transport layer disposed on the charge generation layer, and a protective layer. See example 28 at pages 32-33. The protective layer comprises particulate alumina having a specific resistivity of 2.5×10^{12} Ω·cm, which meets the protective layer limitations recited in instant claims 5 and 6. The charge generation layer comprises titanyl phthalocyanine crystals dispersed in a binder resin. The charge generation layer comprises titanyl phthalocyanine crystals that exhibit an X-ray diffraction pattern having a maximum peak at a Bragg angle ($2\theta \pm 0.2°$) of 27.2°, a lowest peak at 7.3°, peaks at 9.4°, 9.6°, and 24°, no peaks between 7.4° and 9.3°, and no peak at 26.3°. The diffraction pattern is obtained by irradiating the titanyl phthalocyanine with an X-ray of Cu-Kα having a wavelength of "1.541 Å." Paragraph 0151; Fig. 6; and example 28 at pages 32-33. The location of the peaks at angles 7.3°, 9.4°, 9.6°, and 24° were determined by measuring the positions of the

peaks with a ruler and interpolating the positions on the x-axis scale in Fig. 6. The titanyl phthalocyanine meets the phthalocyanine limitations recited in instant claims 1 and 2.

Niimi'633 further teaches that the charge transport layer can be formed from a non-halogen solvent, such as tetrahydrofuran or dioxane, which meets the solvent limitations recited in instant claims 7 and 8. Paragraph 0173 and example 1 in paragraphs 0364-0367.

Niimi'633 does not disclose that its light irradiator provides a write light having a resolution of 600 dpi or greater as recited in the instant claims.

Sakai discloses a multi-beam scanning device to imagewise irradiate the charged photoconductor to form a latent electrostatic latent image. The multi-beam scanning device comprises a semiconductor laser (or laser diode) array **112** and a rotary polygonal mirror **152**. The scanning device provides a writing density of 1200 dpi and the laser beam has a beam spot diameter of 30 μm. The discussion of Sakai in paragraph 10 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art to use the Sakai multi-beam scanning device as the light irradiator in the apparatus disclosed by Niimi'633. That person would have had a reasonable expectation of

successfully obtaining an image forming apparatus that provides good quality reproduced images having a resolution of 1200 dpi.

The cited prior art does not expressly describe an image developer that develops a latent electrostatic image formed on the surface of the photoreceptor within 200 msec after the surface of the photoreceptor is exposed by the light irradiator as recited in instant claim 1. Nor does cited prior art expressly describe a light irradiator that irradiates a write light on the surface of the photoreceptor with an exposure energy of 5 erg/cm^2 or less as recited in instant claim 1.

However, said recitations are merely functional language describing how the apparatus functions. For the reasons discussed <u>supra</u>, the apparatuses and process cartridge rendered obvious over the combined teachings of the prior art meet all of the structural and compositional limitations recited in the instant claims. The functional recitations do not distinguish the structural elements in the instantly claimed apparatus and process cartridge from those in the apparatuses and process cartridge rendered obvious over the cited prior art.

Furthermore, according to the instant specification, the characteristic time in speedup monochrome electrophotographic apparatuses from a "writing portion," i.e., exposure from the light irradiator in the apparatus, to a "development portion,"

i.e., development of the latent image with a toner, is "about 200 msec at the longest." See the instant specification, the paragraph bridging pages 3 and 4. Thus, the time between exposure and development of "within 200 msec" recited in instant claim 1 appears to be characteristic of the state of the art as of the filing date of the instant application. The instant specification further discloses that in tandem full-color electrophotographic apparatus, where the photoconductors have a diameter of 30 μm and the copying speed reaches 30 sheets/min or greater, "the time between exposure and development can be set only equal to or less than that of the monochrome electrophotographic apparatus." Page 4, lines 2-10. Thus, a person having ordinary skill in the art would have reasonably expected that the time from exposure to development in speedup image forming apparatuses based on the state of the art, such as those taught by Niimi'633, is at most 200 msec.

Moreover, as discussed above, the Niimi'633 teaches a photoreceptor that meets all the structural and compositional limitations recited in the instant claims. In addition, in example 28 of Niimi'633, a laser diode having a wavelength of 780 nm is used as the light source for image exposure. Niimi'633, paragraph 0491. JP'538 exemplifies a photoreceptor comprising a charge generation layer comprising titanyl

phthalocyanine crystals that exhibit an X-ray diffraction pattern that is similar to that of the Niimi'633 titanyl phthalocyanine crystals and that meets the peak locations recited in instant claims 1 and 2. The discussion of JP'538 and Ladd in paragraph 10 are incorporated herein by reference. As discussed in paragraph 10 above, according to JP'538, the light exposure energy at a wavelength of 780 nm required to reduce the surface potential of the photoreceptor 15 seconds after charging is 0.20 $\mu J/cm^2$, i.e., 2 erg/cm^2. The light exposure energy of 2 erg/cm^2 is within the range of "5 erg/cm^2 or less" recited in instant claim 1. Accordingly, because Niimi'633 photoreceptor comprises titanyl phthalocyanine crystals that appear to exhibit a X-ray diffraction pattern that is similar to that of JP'538, it is reasonable to presume that the photosensitivity of the Niimi'633 photoreceptor would also be similar to that in JP'538. The burden is on applicants to prove otherwise.

Thus, it would have obvious for a person having ordinary skill in the art to minimize, through routine experimentation, the light exposure energy in the image forming apparatus rendered obvious over the combined teachings of Niimi'633 and Sakai such that the light exposure is within the range of 5 erg/cm^2 or less as recited in instant claim 1. The "motivation" to minimize the light exposure energy is the common

technological desire to maximize the efficient use of energy in processes and apparatuses.

13. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Niimi'633, as evidenced by applicants' admission 2, JP'538, and Ladd, combined with Sakai, as applied to claim 1 above, further combined with JP'337, as evidenced by Ladd. See the USPTO translations of JP'538 and JP'337 for cites.

Niimi'633, as evidenced by applicants' admission 2, JP'538, and Ladd, combined with Sakai renders obvious an image forming apparatus as described in paragraph 12 above, which is incorporated herein by reference.

Niimi'633 does not exemplify the use of titanyl phthalocyanine crystals having an average particle diameter as recited in the instant claim. However, as discussed in paragraph 12 above, the Niimi'633 charge generation layer comprises titanyl phthalocyanine crystals dispersed in a binder resin, where the titanyl phthalocyanine crystals exhibit an X-ray diffraction pattern having a maximum peak at a Bragg angle of 27.2°.

JP'337 teaches a dispersion comprising a titanyl phthalocyanine crystal that exhibits an X-ray diffraction

pattern having a maximum peak at a Bragg angle ($2\theta \pm 0.2°$) of 27.2° and a particular polyvinyl acetyl binder resin. The discussions of JP'337 and Ladd in paragraph 11 above are incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of JP'337, to form a dispersion comprising the Niimi'633 titanyl phthalocyanine crystals and the JP'337 particular polyvinyl acetal binder resin as taught by JP'337, such that the resultant dispersion has a mean grain diameter of 0.28 µm, and to use the resultant dispersion to form the charge generation layer in the photoreceptor in the image forming apparatus rendered obvious over the combined teachings of Niimi'633 and Sakai. That person would have had a reasonable expectation of successfully obtaining an image forming apparatus that has improved photosensitivity and that has stable charging properties and residual potential properties after repeated use.

14. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Niimi'633, as evidenced by applicants' admission 2, JP'538, and Ladd, combined with Sakai, as applied to claim 1 above, further combined with US 2002/0051654 (Niimi'654). See the USPTO translation of JP'538 for cites.

Niimi'633, as evidenced by applicants' admission 2, JP'538, and Ladd, combined with Sakai renders obvious an image forming apparatus as described in paragraph 12 above, which is incorporated herein by reference.

Niimi'633 does not exemplify a charge transport layer comprising a charge transport material as recited in instant claim 4.

Niimi'654 teaches that polycarbonates comprising triarylamine structures in the main and/or side-chain of the polymer can be used as charge transport materials in charge transport layers. Paragraph 0186-0200. According to Niimi'654, charge transport layers that comprise said polycarbonates have good abrasion resistance. Paragraph 0186.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Niimi'654, to use the polycarbonate charge transporting material disclosed by Niimi'654 as the charge transport material in the charge transport layer in the photoreceptor in the image forming apparatus rendered obvious over the combined teachings of Niimi'633 and Sakai. That person would have had a reasonable expectation of successfully obtaining an image forming apparatus that has improved resistant to abrasion, and thus improved mechanical stability after repeated use.

15. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Niimi'633, as evidenced by applicants' admission 2, JP'538, and Ladd, combined with Sakai, as applied to claim 1 above, further combined with US 6,120,955 (Tokutake). See the USPTO translation of JP'538 for cites.

Niimi'633, as evidenced by applicants' admission 2, JP'538, and Ladd, combined with Sakai renders obvious an image forming apparatus as described in paragraph 12 above, which is incorporated herein by reference.

Niimi'633 does not exemplify the use of an electroconductive drum having an anodized surface as recited in instant claim 9. However, Niimi'633 does not limit type of conductive aluminum substrate used. Paragraph 0143, lines 5 and 10-15.

Tokutake teaches a conductive aluminum drum that has a particular sealed anodized layer formed on the surface of said drum. According to Tokutake, when an electrophotographic photosensitive member, i.e., a photoreceptor, comprises said conductive aluminum drum as the conductive substrate, there is no formation of imaging noise, such as black spots or white spots under any environmental condition. Col. 2, lines 16-26, and example 1 at col. 9, lines 37-64.

It would have been obvious for a person having ordinary

skill in the art to use the Tokutake electrically conductive aluminum drum comprising the particular sealed anodized layer as the conductive drum in the photoreceptor in the image forming apparatus rendered obvious over the combined teachings of Niimi'633 and Sakai. That person would have had a reasonable expectation of successfully obtaining an image forming apparatus that provides images without the occurrence of black spots and white spots under any environment condition.

16. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niimi'633, as evidenced by applicants' admission 2, JP'538, and Ladd, combined with Sakai, as applied to claim 1 above, further combined with Niimi'654. See the USPTO translation of JP'538 for cites.

Niimi'633, as evidenced by applicants' admission 2, JP'538, and Ladd, combined with Sakai renders obvious an image forming apparatus as described in paragraph 12 above, which is incorporated herein by reference.

The claims are rejected for the reasons discussed in the office action mailed on Mar. 9, 2006, paragraph 26, which are incorporated herein by reference.

17. Applicants' arguments filed on Aug. 6, 2007, as applicable to the prior art rejections set forth in paragraphs 8 and 10-16 above have been fully considered but they are not persuasive.

Applicants assert that the none of cited prior art discloses or suggests a light irradiator, "which irradiates a write light having a resolution of 600 dpi or greater. . . with an exposure energy of 5 erg/cm^2 or less" or a developer, "which feeds a developing agent to the latent electrostatic image within 200 msec after the surface of the electrophotographic photoreceptor was irradiated with the write light" as recited in instant claim 1.

Applicants' assertions are not persuasive. First, for the reasons discussed in the rejections in the paragraphs above, the cited prior art either discloses or renders obvious electrophotographic imaging apparatuses and process cartridges that meet <u>all</u> the structural limitations of the electrophotographic apparatus and process cartridge recited in the instant claims. Applicants have not pointed to any claimed structural feature of the electrophotographic apparatus and process cartridge that differs from those taught by the cited prior art. The instant claims are directed to an electrophotographic apparatus and a process cartridge, not to a method of forming an image. For the reasons discussed in

paragraphs 8, 10 and 12 above, said recitations recited in instant claim 1 are merely functional language describing how the developer, photoreceptor, and the light irradiator in the apparatus are intended to be employed. "Claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function." See MPEP 2114 and 2115 and cases cited therein. Accordingly, the recitations do not distinguish the structural elements in the instantly claimed apparatus and process cartridge from those in the apparatuses and process cartridges disclosed by or rendered obvious over teachings in the cited prior art.

Moreover, as discussed in paragraphs 8, 10, and 12, as described in the instant specification, it is known that in state of the art image forming apparatuses, the time between exposure from the light irradiator to the development of the latent image with a toner is "about 200 msec at the longest." Thus, a person having ordinary skill in the art would have reasonably expected that the time from exposure to development in speedup image forming apparatuses based on the state of the art, such as those taught by the prior art Sugino, Niimi'295, and Niimi'633, is at most 200 msec.

Furthermore, for the reasons discussed in the rejection over Sugino in paragraph 8 above, it appears that the light

irradiator in the image forming apparatus is capable of providing an exposure energy as recited in instant claim 1. The reference's image forming apparatus and photoreceptor meet the other limitations of the apparatus and photoreceptor claimed by applicants. The reference photoreceptor is therefore expected to have the same or similar photosensitivity. Thus, low irradiation energies would be expected to be useful. The burden is on applicants to show otherwise.

In addition, for the reasons discussed in paragraphs 10 and 12, it appears that the Niimi'295 photoreceptor and the Niimi'633 photoreceptor have photosensitivities similar to that in JP'538, i.e., 2 erg/cm^2, the light exposure energy at a wavelength of 780 nm required to reduce the surface potential of the photoreceptor 15 seconds after charging. For the reasons discussed in paragraphs 10 and 12, it would have been obvious to minimize, through routine experimentation, the light exposure energy in the image forming apparatuses rendered obvious over the combined teachings of Niimi'295 or Niimi'633 with Sakai, such that the light exposure is within the range of 5 erg/cm^2 or less as recited in instant claim 1.

Accordingly, the rejections in paragraphs 8 and 11—16 stand.

18. Claims 1-15 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-37 of US Patent No. 7,029,810 B2 (Toda), as evidenced by applicants' admission 2, JP'538, and Ladd, in view of Sakai. See the USPTO translation of JP'538 for cites.

Reference claim 4, which depends on reference claim 1 of Toda, recites an image forming apparatus comprising at least one image forming unit that comprises a photoreceptor, a charger, a light irradiator, an image developer, and a transferer. The photoreceptor comprises an electroconductive substrate comprising a charge generation layer and a charge transport layer disposed over the charge generation layer. The charge generation layer comprises titanyl phthalocyanine crystals that exhibit an X-ray diffraction pattern having a maximum peak at a Bragg angle ($2\theta \pm 0.2°$) of 27.2°, a lowest peak at 7.3°, peaks at 9.4°, 9.6°, and 24.0°, no peaks greater than 7.3° and less than 9.4°, and no peak at 26.3°. The diffraction pattern is obtained by irradiating the titanyl phthalocyanine crystals with a Cu-Kα X-ray having a wavelength of 1.542 Å. The titanyl phthalocyanine crystals meet the titanyl phthalocyanine crystals recited in instant claims 1 and 2. Reference claim 5, which depends from reference claim 1, requires that the titanyl phthalocyanine crystals have an average particle diameter of

less than 0.3 μm, which meets the particle diameter limitation recited in instant claim 3. Reference claims 8, 14, and 15, which depend from reference claim 1, recite a charge transport layer that meets the charge transport layer limitations recited in instant claims 4, 7, and 8, respectively. Reference claims 9 and 10, which depend from reference claim 1, recite that the photoreceptor further comprise a protective layer disposed on the charge transport layer that meets the protective layer limitations recited in instant claims 5 and 6, respectively. Reference claim 16, which depends from reference claim 1, requires that the conductive substrate have an anodized film as recited in instant claim 9. Reference claim 17, which depends from reference claim 1, requires that the apparatus comprise a plurality of image forming units, which meets the apparatus limitation recited in instant claim 10. Reference claims 18 and 19, which depend on reference claim 1, require that the charger be a contact charger or a non-contact charger, as recited in instant claim 11 and in instant claims 12 and 13, respectively. Reference claim 20, which depends on reference claim 1, requires that an alternating superimposed voltage can be applied to the charger, which meets the charger limitation recited in instant claim 14.

The claims in Toda do not recite that the light irradiator

provides a write light having a resolution of 600 dpi or greater as recited in the instant claims.

Sakai discloses a multi-beam scanning device to imagewise irradiate the charged photoconductor to form a latent electrostatic latent image. The multi-beam scanning device comprises a semiconductor laser (or laser diode) array **112** and a rotary polygonal mirror **152**. The scanning device provides a writing density of 1200 dpi and the laser beam has a beam spot diameter of 30 μm. The discussion of Sakai in paragraph 10 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the subject matter recited in the claims of Toda and the teachings in Sakai, to use the Sakai multi-beam scanning device as the light irradiator in the apparatus claimed in Toda. That person would have had a reasonable expectation of successfully obtaining an image forming apparatus that provides good quality reproduced images having a resolution of 1200 dpi.

The claims in Toda do not recite, and Sakai does not disclose an image developer that develops a latent electrostatic image formed on the surface of the photoreceptor within 200 msec after the surface of the photoreceptor is exposed by the light irradiator as recited in instant claim 1. Nor do Toda claims

recite or Sakai disclose a light irradiator that irradiates a write light on the surface of the photoreceptor with an exposure energy of 5 erg/cm^2 or less as recited in instant claim 1.

However, said recitations are merely functional language describing how the apparatus functions. For the reasons discussed <u>supra</u>, the apparatus rendered obvious over the subject matter claimed in Toda combined with the teachings of Sakai meet all of the structural limitations recited in the instant claims. The functional recitations do not distinguish the structural elements in the instantly claimed apparatus from those in the apparatus rendered obvious over the subject matter claimed in Toda combined with the teachings of Sakai.

Furthermore, based on the disclosure in the instant specification, the time between exposure and development of "within 200 msec" recited in instant claim 1 appears to be characteristic of the state of the art as of the filing date of the instant application. The discussion of the disclosure in the instant specification at pages 3 and 4 in paragraph 10 above is incorporated herein by reference. Thus, a person having ordinary skill in the art would have reasonably expected that the time from exposure to development in speedup image forming apparatuses based on the state of the art, such as those claimed in Toda, is at most 200 msec.

Moreover, as discussed above, the photoreceptor claimed in Toda meets all the structural and compositional limitations recited in the instant claims. JP'538 exemplifies a photoreceptor comprising a charge generation layer comprising titanyl phthalocyanine crystals that exhibit an X-ray diffraction pattern that is similar to that of the claimed in Toda and meets the peak locations recited in instant claims 1 and 2. The discussions of JP'538 and Ladd in paragraph 10 are incorporated herein by reference. As discussed in paragraph 10 above, according to JP'538, the light exposure energy at a wavelength of 780 nm required to reduce the surface potential of the photoreceptor 15 seconds after charging is 0.20 $\mu J/cm^2$, i.e., 2 erg/cm^2. The light exposure energy of 2 erg/cm^2 is within the range of "5 erg/cm^2 or less" recited in instant claim 1. Accordingly, because the photoreceptor recited in the claims of Toda comprises titanyl phthalocyanine crystals that appear to exhibit a X-ray diffraction pattern that is similar to that of JP'538, it is reasonable to presume that the photosensitivity of the photoreceptor in Toda would also be similar to that in JP'538. The burden is on applicants to prove otherwise.

Thus, it would have obvious for a person having ordinary skill in the art to minimize, through routine experimentation, the light exposure energy in the image forming apparatus

rendered obvious over the subject matter claimed in Toda combined with teachings of Sakai such that the light exposure is within the range of 5 erg/cm^2 or less as recited in instant claim 1. The "motivation" to minimize the light exposure energy is the common technological desire to maximize the efficient use of energy in processes and apparatuses.

19. Claims 1-3, 5, 6 and 9-15 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5-10, and 12-19 of copending Application No. 10/454,556 (Application'556), as evidenced by applicants' admission 2, JP'538, and Ladd, in view of Sakai. See the USPTO translation of JP'538 for cites.

The examiner notes that the reasons for rejection are based on the claims as amended in the response filed in Application'556 on Sep. 11, 2007.

Reference claim 14, which depends on reference claim 5, which in turn depends on reference claim 1 of Application'556, recites an image forming apparatus comprising at least one image forming unit that comprises a photoreceptor, a charger, a light irradiator, an image developer, and a transferer. The photoreceptor comprises an electroconductive substrate comprising a charge generation layer and a charge transport

layer disposed over the charge generation layer. The charge generation layer comprises titanyl phthalocyanine crystals that exhibit an X-ray diffraction pattern having a maximum peak at a Bragg angle ($2\theta \pm 0.2°$) of 27.2°, a lowest peak at 7.3°, peaks at 9.4°, 9.6°, and 24.0°, no peaks between 7.3° and 9.4°, and no peak at 26.3°. The diffraction pattern is obtained by irradiating the titanyl phthalocyanine crystals with a Cu-Kα X-ray having a wavelength of 1.542 Å. The titanyl phthalocyanine crystals have an average particle diameter of not greater than 0.2 μm. The titanyl phthalocyanine crystals meet the titanyl phthalocyanine crystals recited in instant claims 1-3. Reference claims 7 and 8, which depend from reference claim 5, require that the photoreceptor further comprise a protective layer disposed on the charge transport layer that meets the protective layer limitations recited in instant claims 5 and 6, respectively. Reference claim 12, which depends from reference claim 5, requires that the conductive substrate have an anodized film as recited in instant claim 9. Reference claim 15, which depends from reference claim 14, requires that the apparatus comprises a plurality of image forming units, which meets the apparatus limitation recited in instant claim 10. Reference claims 16 and 17, which depend on reference claim 14, require that the charger be a contact charger or a non-contact charger as recited

in instant claim 11 and in instant claims 12 and 13, respectively. Reference claim 18, which depends on reference claim 14, requires that an alternating superimposed voltage can be applied to the charger, which meets the charger limitation recited in instant claim 14. Reference claim 19, which also depends from reference claim 5, recites a process cartridge comprising said photoreceptor and at least one of a charger, a light irradiator, an image developer, a transferer, and a cleaner.

The claims in Application'556 do not recite that the light irradiator provides a write light having a resolution of 600 dpi or greater as recited in the instant claims.

Sakai discloses a multi-beam scanning device to imagewise irradiate the charged photoconductor to form a latent electrostatic latent image. The multi-beam scanning device comprises a semiconductor laser (or laser diode) array **112** and a rotary polygonal mirror **152**. The scanning device provides a writing density of 1200 dpi and the laser beam has a beam spot diameter of 30 μm. The discussion of Sakai in paragraph 10 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the subject matter recited in the claims of Application'556 and the teachings in Sakai, to use the

Sakai multi-beam scanning device as the light irradiator in the apparatus and process cartridge claimed in Application'556. That person would have had a reasonable expectation of successfully obtaining an image forming apparatus and a process cartridge that provide good quality reproduced images having a resolution of 1200 dpi.

The claims in Application'556 do not recite, and Sakai does not disclose an image developer that develops a latent electrostatic image formed on the surface of the photoreceptor within 200 msec after the surface of the photoreceptor is exposed by the light irradiator as recited in instant claim 1. Nor do Application'556 claims recite or Sakai disclose a light irradiator that irradiates a write light on the surface of the photoreceptor with an exposure energy of 5 erg/cm^2 or less as recited in instant claim 1.

However, said recitations are merely functional language describing how the apparatus functions. For the reasons discussed supra, the apparatus rendered obvious over the subject matter claimed in Application'556 combined with the teachings of Sakai meet all of the structural limitations recited in the instant claims. The functional recitations do not distinguish the structural elements in the instantly claimed apparatus from those in the apparatus rendered obvious over the subject matter

claimed in Application'556 combined with the teachings of Sakai.

Furthermore, based on the disclosure in the instant specification, the time between exposure and development of "within 200 msec" recited in instant claim 1 appears to be characteristic of the state of the art as of the filing date of the instant application. The discussion of the disclosure in the instant specification at pages 3 and 4 in paragraph 10 above is incorporated herein by reference. Thus, a person having ordinary skill in the art would have reasonably expected that the time from exposure to development in speedup image forming apparatuses based on the state of the art, such as those claimed in Application'556, is at most 200 msec.

Moreover, as discussed above, the photoreceptor claimed in Application'556 meets all the structural and compositional limitations recited in the instant claims. JP'538 exemplifies a photoreceptor comprising a charge generation layer comprising titanyl phthalocyanine crystals that exhibit an X-ray diffraction pattern that is similar to that of the claimed in Application'556 and meets the peak locations recited in instant claims 1 and 2. The discussions of JP'538 and Ladd in paragraph 10 are incorporated herein by reference. As discussed in paragraph 10 above, according to JP'538, the light exposure energy at a wavelength of 780 nm required to reduce the surface

potential of the photoreceptor 15 seconds after charging is $0.20\ \mu J/cm^2$, i.e., $2\ erg/cm^2$. The light exposure energy of $2\ erg/cm^2$ is within the range of "$5\ erg/cm^2$ or less" recited in instant claim 1. Accordingly, because the photoreceptor recited in the claims of Application'556 comprises titanyl phthalocyanine crystals that appear to exhibit a X-ray diffraction pattern that is similar to that of JP'538, it is reasonable to presume that the photosensitivity of the photoreceptor in Application'556 would also be similar to that in JP'538. The burden is on applicants to prove otherwise.

Thus, it would have obvious for a person having ordinary skill in the art to minimize, through routine experimentation, the light exposure energy in the image forming apparatuses rendered obvious over the subject matter claimed in Application'556 combined with teachings of Sakai such that the light exposure is within the range of $5\ erg/cm^2$ or less as recited in instant claim 1. The "motivation" to minimize the light exposure energy is the common technological desire to maximize the efficient use of energy in processes and apparatuses.

20. Claims 1-3, 5, 6, and 10-15 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as

being unpatentable over claims 1-24 and 29-35 of copending Application No. 10/944,614 (Application'614), as evidenced by applicants' admission 2, JP'538, and Ladd, in view of Sakai. See the USPTO translation of JP'538 for cites.

The examiner notes that the reasons for rejection are based on the claims as amended in the response filed in Application'614 on Aug. 15, 2007.

Reference claim 29, which depends on reference claim 1 of Application'614, recites an image forming apparatus comprising at least one image forming unit that comprises a photoreceptor, a charger, a light irradiator, an image developer, and a transfer device. The photoreceptor comprises an electroconductive substrate comprising a photosensitive layer that comprises titanyl phthalocyanine crystals that exhibit an X-ray diffraction pattern having a maximum peak at a Bragg angle ($2\theta \pm 0.2°$) of 27.2°, a lowest peak at 7.3°, peaks at 9.4°, 9.6°, and 24.0°, no peaks between 7.3° and 9.4°, and no peak at 26.3°. The diffraction pattern is obtained by irradiating the titanyl phthalocyanine crystals with a Cu-Kα X-ray having a wavelength of 1.542 Å. The titanyl phthalocyanine crystals have an average particle diameter of less than or equal to 0.25 μm. The titanyl phthalocyanine crystals meet the titanyl phthalocyanine crystals recited in instant claims 1-3. Reference claim 2,

which depends from reference claim 1, requires that photosensitive layer comprises a charge generation layer comprising the titanyl phthalocyanine crystals and a charge transport layer disposed over the charge generation layer, which meets the layer structure recited in instant claim 1. Reference claims 18-20, which depend from reference claim 1, recite that the photoreceptor further comprises a protective layer disposed on the charge transport layer that meets the protective layer limitations recited in instant claims 5 and 6. Reference claim 30, which depends from reference claim 29, requires that the apparatus comprise a plurality of image forming units, which meets the apparatus limitation recited in instant claim 10. Reference claims 31 and 32, which depend on reference claim 29, require that the charger be a contact charger or a non-contact charger as recited in instant claim 11 and in instant claims 12 and 13, respectively. Reference claim 33, which depends on reference claim 1, requires that an alternating superimposed voltage can be applied to the charger, which meets the charger limitation recited in instant claim 14. Reference claim 34, which also depends from reference claim 1, recites a process cartridge comprising said photoreceptor, a cleaner, and at least one of a charger, a light irradiator, and an image developer.

The claims in Application'614 do not recite that the light

irradiator provides a write light having a resolution of 600 dpi or greater as recited in the instant claims.

Sakai discloses a multi-beam scanning device to imagewise irradiate the charged photoconductor to form a latent electrostatic latent image. The multi-beam scanning device comprises a semiconductor laser (or laser diode) array **112** and a rotary polygonal mirror **152**. The scanning device provides a writing density of 1200 dpi and the laser beam has a beam spot diameter of 30 μm. The discussion of Sakai in paragraph 10 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the subject matter recited in the claims of Application'614 and the teachings in Sakai, to use the Sakai multi-beam scanning device as the light irradiator in the apparatus and process cartridge claimed in Application'614. That person would have had a reasonable expectation of successfully obtaining an image forming apparatus and a process cartridge that provide good quality reproduced images having a resolution of 1200 dpi.

The claims in Application'614 do not recite, and Sakai does not disclose an image developer that develops a latent electrostatic image formed on the surface of the photoreceptor within 200 msec after the surface of the photoreceptor is

exposed by the light irradiator as recited in instant claim 1. Nor do Application'614 claims recite or Sakai disclose a light irradiator that irradiates a write light on the surface of the photoreceptor with an exposure energy of 5 erg/cm^2 or less as recited in instant claim 1.

However, said recitations are merely functional language describing how the apparatus functions. For the reasons discussed supra, the apparatus rendered obvious over the subject matter claimed in Application'614 combined with the teachings of Sakai meet all of the structural limitations recited in the instant claims. The functional recitations do not distinguish the structural elements in the instantly claimed apparatus from those in the apparatus rendered obvious over the subject matter claimed in Application'614 combined with the teachings of Sakai.

Furthermore, based on the disclosure in the instant specification, the time between exposure and development of "within 200 msec" recited in instant claim 1 appears to be characteristic of the state of the art as of the filing date of the instant application. The discussion of the disclosure in the instant specification at pages 3 and 4 in paragraph 10 above is incorporated herein by reference. Thus, a person having ordinary skill in the art would have reasonably expected that the time from exposure to development in speedup image forming

apparatuses based on the state of the art, such as those claimed in Application'614, is at most 200 msec.

Moreover, as discussed above, the photoreceptor claimed in Application'614 meets all the structural and compositional limitations recited in the instant claims. JP'538 exemplifies a photoreceptor comprising a charge generation layer comprising titanyl phthalocyanine crystals that exhibit an X-ray diffraction pattern that is similar to that of the claimed in Application'614 and meets the peak locations recited in instant claims 1 and 2. The discussions of JP'538 and Ladd in paragraph 10 are incorporated herein by reference. As discussed in paragraph 10 above, according to JP'538, the light exposure energy at a wavelength of 780 nm required to reduce the surface potential of the photoreceptor 15 seconds after charging is 0.20 $\mu J/cm^2$, i.e., 2 erg/cm^2. The light exposure energy of 2 erg/cm^2 is within the range of "5 erg/cm^2 or less" recited in instant claim 1. Accordingly, because the photoreceptor recited in the claims of Application'614 comprises titanyl phthalocyanine crystals that appear to exhibit a X-ray diffraction pattern that is similar to that of JP'538, it is reasonable to presume that the photosensitivity of the photoreceptor in Application'614 would also be similar to that in JP'538. The burden is on applicants to prove otherwise.

Thus, it would have obvious for a person having ordinary skill in the art to minimize, through routine experimentation, the light exposure energy in the image forming apparatuses rendered obvious over the subject matter claimed in Application'614 combined with teachings of Sakai such that the light exposure is within the range of 5 erg/cm^2 or less as recited in instant claim 1. The "motivation" to minimize the light exposure energy is the common technological desire to maximize the efficient use of energy in processes and apparatuses.

21. Applicants' arguments filed on Aug. 6, 2007, as applicable to the rejections in paragraphs 18-20 above have been fully considered but they are not persuasive.

Applicants assert that the subject matter claimed in Toda, Application'556, or Application'614 does not recite, and Sakai does not disclose or suggest a light irradiator, "which irradiates a write light having a resolution of 600 dpi or greater. . . with an exposure energy of 5 erg/cm^2 or less" or a developer, "which feeds a developing agent to the latent electrostatic image within 200 msec after the surface of the electrophotographic photoreceptor was irradiated with the write light" as recited in instant claim 1.

Applicants' assertions are not persuasive. First, for the reasons discussed in the rejections in paragraphs 18-20 above, the subject matter claimed in Toda, Application'556, or Application'614 combined with the teachings of Sakai renders obvious electrophotographic imaging apparatuses and process cartridges that meet <u>all</u> the structural limitations of the electrophotographic apparatus and process cartridge recited in the instant claims. Applicants have not pointed to any claimed structural feature of the electrophotographic apparatus and process cartridge that differs from those claimed or taught by the cited references. The instant claims are directed to an electrophotographic apparatus and a process cartridge, not to a method of forming an image. For the reasons discussed in paragraphs 18-20 above, said recitations recited in instant claim 1 are merely functional language describing how the developer, photoreceptor, and the light irradiator in the apparatus are intended to be employed. "Claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function." See MPEP 2114 and 2115 and cases cited therein. Accordingly, the recitations do not distinguish the structural elements in the instantly claimed apparatus and process cartridge from those in the apparatuses

and process cartridges rendered obvious over the cited references.

Moreover, as discussed in paragraphs 18-20, as described in the instant specification, it is known that in the state of the art image forming apparatuses, the time between exposure from the light irradiator to the development of the latent image with a toner is "about 200 msec at the longest." Thus, a person having ordinary skill in the art would have reasonably expected that the time from exposure to development in speedup image forming apparatuses based on the state of the art, such as those claimed in Toda, Application'556, and Application'614, is at most 200 msec.

Furthermore, for the reasons discussed in paragraphs 18-20, it appears that the photoreceptors claimed in Toda, Application'556, and Application'614 have photosensitivities similar to that in JP'538, i.e., 2 erg/cm^2, the light exposure energy at a wavelength of 780 nm required to reduce the surface potential of the photoreceptor 15 seconds after charging. For the reasons discussed in paragraphs 18-20, it would have been obvious to optimize, through routine experimentation, the light exposure energy in the image forming apparatuses rendered obvious over the subject matter claimed in Toda, Application'556, and Application'614, each combined with Sakai,

such that the light exposure is within the range of 5 erg/cm^2 or less as recited in instant claim 1.

Accordingly, the rejections in paragraphs 18-20 stand.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janis L. Dote whose telephone number is (571) 272-1382. The examiner can normally be reached Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry regarding papers not received regarding this communication or earlier communications should be directed to Supervisory Application Examiner Ms. Claudia Sullivan, whose telephone number is (571) 272-1052.

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JLD
Nov. 3, 2007